

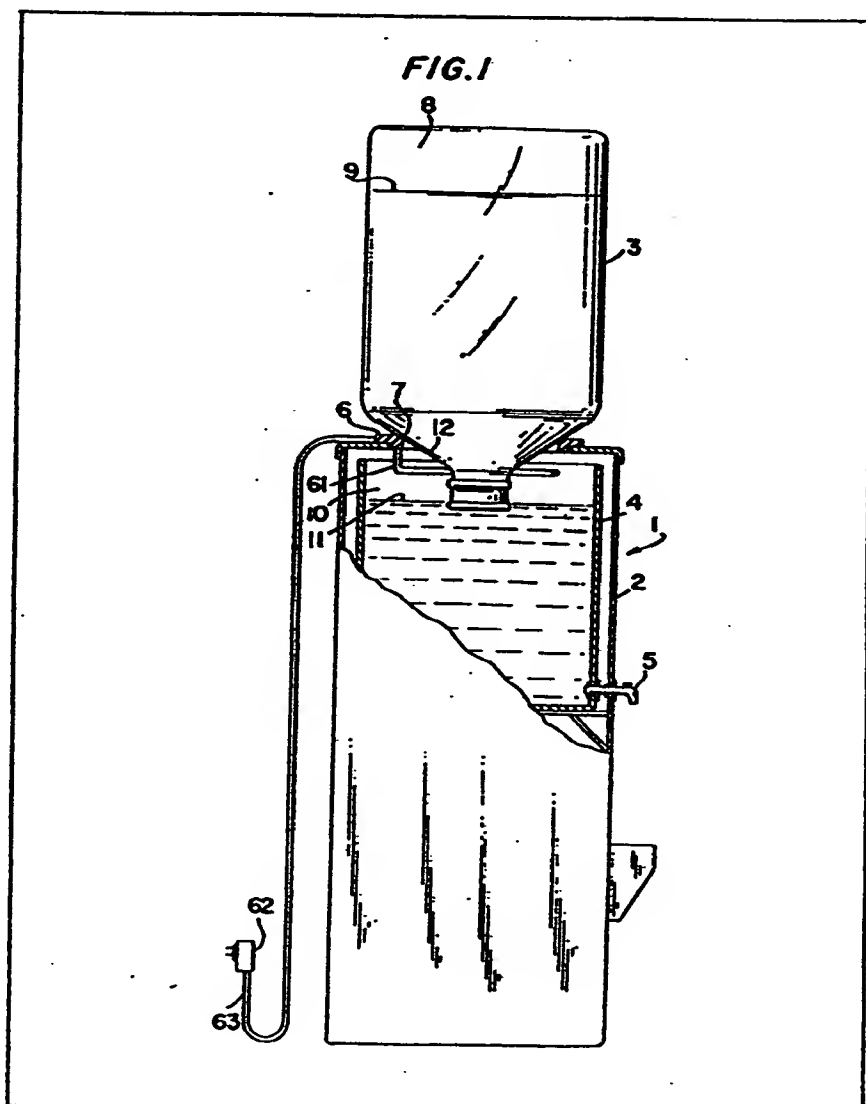
(12) UK Patent Application (19) GB (11) 2 022 979 A

- (21) Application No 7908687
 (22) Date of filing 12 Mar 1979
 (23) Claims filed 12 Mar 1979
 (30) Priority data
 (31) 885880
 (32) 13 Mar 1978
 (33) United States of America (US)
 (43) Application published 19 Dec 1979
 (51) INT CL²
 C02B 3/02
 (52) Domestic classification
 H5R 23 24
 (56) Documents cited
 GB 1093751
 GB 498282
 GB 419929
 GB 358083
 GB 324503
 (58) Field of search
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 H5R
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(54) Purifying water by ultra violet irradiation

(57) Existing water dispensers are modified or new water dispensers are built by incorporating into the water dispenser (1) and annular collar (6) adapted to surround the opening into

which the water bottle (3) is normally inverted, the collar having secured thereto an annular lamp (6a) for emitting ultraviolet and/or ozone-producing radiation, the lamp being at or adjacent the normal high water line (11) of the reservoir (4) of water contained within the dispenser.



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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FIG. 1

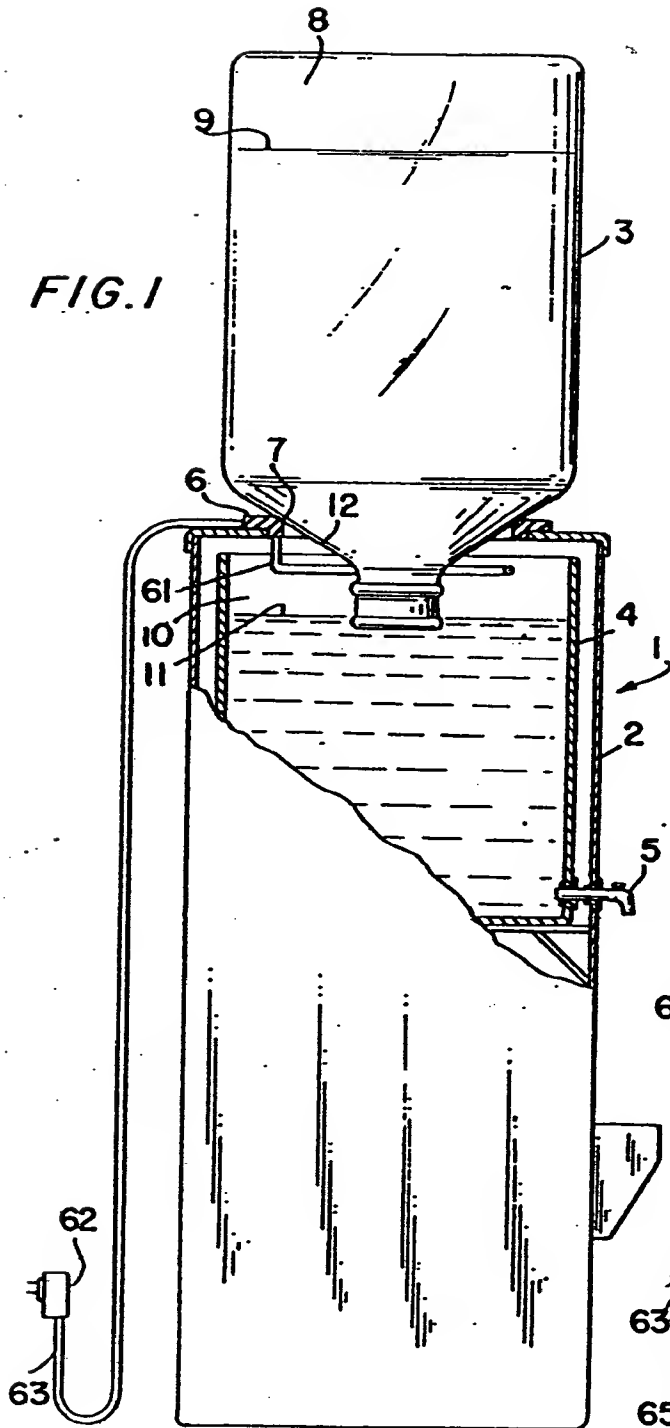


FIG. 2

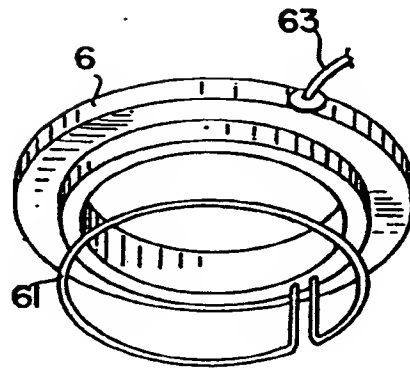


FIG. 4

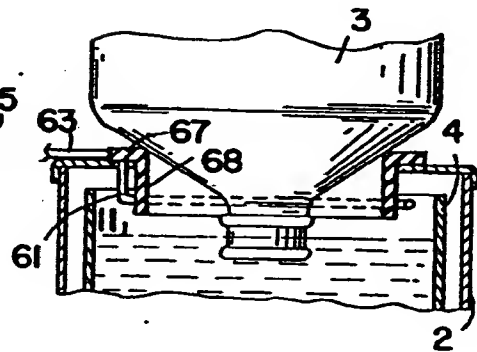
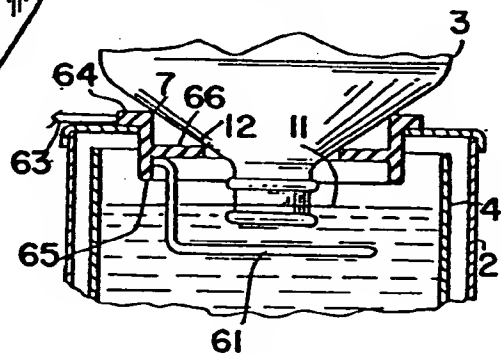


FIG. 3



SPECIFICATION

Apparatus for purification of water

The present invention relates to apparatus for purification of water dispensed from a water dispenser.

Bottled water is dispensed from a water dispenser having an opening in the top thereof into which an inverted water bottle is placed and a reservoir below the water bottle for storing water that flows from the inverted water bottle. Water is dispensed from the reservoir by a suitable valve-operated tap.

While the bottled water is purified prior to shipment, the bottles themselves are a source of contamination of the water in the reservoir of the water dispenser. For example, the water bottles are filled in factories and are stored in the factory or in a warehouse. Often the bottles are stored outdoors. This subjects the bottles to contamination with airborne microorganisms as well as dust, grime and other forms of airborne pollution. Even if the bottles are stored indoors in a carefully controlled environment, they must nevertheless be loaded onto trucks by hand, transported through city streets, unloaded by hand, then delivered to the customer. The customer himself must grasp the neck of the bottle when lifting a new bottle onto the water dispenser. The travel through the streets exposes the bottles to airborne pollution in addition to the pollution previously encountered in the factories and warehouses. Further, the handling of the bottles from the time of filling to the time of installation on the water cooler also exposes the bottles to contamination.

Water is dispensed from the reservoir by means of air being drawn into the water dispenser above the water in the reservoir by passing through the interface between the inverted bottle and the top of the dispenser. This air carries with it any airborne impurities present in the location of the dispenser. In addition, when a new bottle is placed onto the dispenser, there is considerable water splashing, which will wet the neck of the bottle and thus wash into the reservoir contaminants that are present on the neck of the bottle.

Thus, there is a need in the art for an improved water purification system for water dispensers of the type discussed above.

It is an object of the invention to provide improved apparatus for purifying water dispensed from a water dispenser.

It is another object of the invention to provide apparatus for sterilizing the neck of a water bottle used in a water dispenser.

These and other objects are fulfilled by the present invention which provides, in a water dispenser having an opening at the top thereof into which a bottle of water is inverted, and a water reservoir fed by gravity from said inverted bottle of water, an annular collar around said opening and means for irradiating water in said reservoir depending from said collar.

The present invention also provides apparatus

for purifying water in a water dispenser, comprising an annular collar, an annular lamp means for emitting radiation depending from said collar, and an electric line cord means connected to said lamp means for supplying electrical power to said lamp means, said line cord means preferably including an integral electrical transformer.

The present invention is illustrated in terms of a preferred embodiment by the accompanying drawing, in which:

Fig. 1 is an elevation view, partly in section, of a water dispenser embodying the present invention;

Fig. 2 is an enlarged detailed view in perspective of the collar and lamp of the present invention;

Fig. 3 is a detail view, in section, of an alternative collar according to the invention; and

Fig. 4 is a detail view, in section, of another embodiment of the invention.

A water dispenser 1 is shown in Fig. 1, which has a cabinet 2 on which sits an inverted water bottle 3. Water from bottle 3 flows by gravity into reservoir 4 where it is chilled by suitable refrigeration means (not shown) and/or heated by suitable heating means (not shown). Water is dispensed from reservoir 4 via tap 5.

Mounted on the top of the annular cabinet 2 is an annular collar 6 having an annular lamp 61 depending therefrom. While lamp 61 is shown as circular, any polygonal shape would also be suitable. Lamp 61 is energized by use of a transformer, 62 that is preferably integral with the electric line cord 63, but can be remote therefrom. It is preferred that collar 6 be opaque so that it acts as a shield to prevent the lamp 61 from emitting ultraviolet radiation into the eyes of the user of the dispenser. Collar 6 should fit snugly around the dispenser 2 to minimize contamination from entering the dispenser. However, there is not a perfect seal between the bottle 3 and the collar 6, and thus air enters the reservoir 4 between the bottle 3 and collar 6 at the circular interface 7 therebetween. Air also enters the bottle 3 at the interface between the collar 6 and the tank 2. The air bubbles upwardly through the water in the bottle 3 to the air space 8 above the water line. Air also exists in air space 10 above water line 11 in reservoir 4. If air were not admitted to air space 8, the water would not flow out of tap 5.

Lamp 61 is conventionally designed to emit radiation at 1849 Å and 2537 Å, respectively. The radiation at 1849 Å generates ozone and the radiation at 2537 Å has a sterilizing and disinfectant action. The ultraviolet radiation at 2537 Å irradiates and thus purifies the water in reservoir 4 so that water dispensed from tap 5 is always free from harmful organisms. Lamp 61 also generates ozone in air space 10. Air drawn into air space 10 is subjected to the germicidal action of ozone and will therefore be freed from many harmful organisms. Ozone in air space 10 will partially dissolve in the water in reservoir 4 and the remainder will bubble up through the water bottle 3. The ozone bubbling through the

water in bottle 3 and reservoir 4 provides a germicidal action on the water in both water storage areas. Furthermore, the ozone in bottle 3 acts as an algicide and fungicide to prevent the growth of algae and/or slime on the inside of bottle 3. Whether the lamp 61 is above the water line 11 as in Fig. 1 or below the water line 11 as in Fig. 3, the same germicidal, algicidal and fungicidal action takes place.

- 10 If desired, lamp 61 can be designed to emit either ultraviolet light or ozone-producing radiation. In addition, while it is preferred that the ozone-producing radiation be emitted at 1849 Å and the ultraviolet radiation be emitted at 2537 Å, 15 In general the ozone-producing radiation can be from about 2000 to about 3000 Å and the ultraviolet radiation can be from about 1000 to about 4000 Å.

Lamp 61 can be operated continuously or 20 periodically. Thus, a timer (not shown) can be used to turn on the lamp 61 only for those hours when the lamp is used or on any other cycle.

Fig. 3 illustrates an embodiment of the invention, wherein the collar 64 has a cylindrical 25 portions 65 and an annular portion 66 to shield the user from radiation emitted by the lamp 61. Shield 66 also acts to reflect the radiation downwardly into the reservoir 4. When lamp 61 is submerged as in Fig. 3, it is provided with a quartz 30 jacket to prevent the water from cooling the lamp.

Fig. 4 illustrates an embodiment of the invention, wherein the collar 67 has a cylindrical 35 portion 68 extending below the lamp 61 so as to shield the user from radiation emitted by the lamp. In Fig. 3 the shielding is such as to permit irradiation of the neck of the bottle 3, whereas in Fig. 4 the neck is shielded from the irradiation by the cylindrical portion 68.

CLAIMS

- 40 1. A water dispenser having an opening at the top thereof into which a bottle of water is inverted, a water reservoir fed by gravity from said inverted bottle of water, an annular collar around said opening, and means for irradiating water in said 45 reservoir depending from said collar and extending toward said reservoir.
2. Apparatus according to claim 1, wherein said irradiating means emits ultraviolet radiation.
3. Apparatus according to claim 1, wherein said 50 irradiating means emits ozone-producing radiation.
4. Apparatus according to claim 1, wherein said irradiating means emits ultraviolet radiation and ozone-producing radiation.
- 55 5. Apparatus according to claim 4, wherein said emitted radiation comprises wavelengths of 1849 Å and 2537 Å.
6. Apparatus according to claim 1, wherein said irradiating means comprises an annular lamp 60 substantially encircling the top of an inverted bottle in said dispenser.
7. Apparatus according to claim 1, wherein said collar is plastic.
8. Apparatus according to claim 1, wherein said 65 collar is circular and said irradiating means comprises a lamp having a circular portion lying in a plane parallel to the plane of the circular collar.
9. Apparatus according to claim 6, wherein there is an electric line cord means connected to said annular lamp for supplying electrical power thereto, said line cord means including an integral 70 electrical transformer.
10. Apparatus according to claim 1, wherein said collar has means for shielding the user from radiation emitted from said irradiating means.
- 75 11. A water dispenser substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.